KINEMATICA AG
Dispersing and Mixing Technology

MANUAL

Operating Instructions for POLYTRON® System PT 2500 E

POLYTRON®
DISPERSING AND MIXING TECHNOLOGY BY KINEMATICA

VOLTAGE
☐ 100...120 V, 50/60 Hz
☐ 210...250 V, 50/60 Hz

Ensure that the supply voltage is correct and in agreement with the data on the rating plate.

This is a quality product of

KINEMATICA AG
Dispergier- und Mischtechnik

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1 INTRODUCTION

This chapter gives information on the the structure of this document. It will assist you in making use of it and show how to find the required information quickly.

1.1 OPERATING INSTRUCTIONS

PLEASE READ THESE OPERATING INSTRUCTIONS BEFORE SWITCHING ON OR OPERATING THE EQUIPMENT. THEY DESCRIBE THE USE OF THE POLYTRON® PT 2500 E, ITS INSTALLATION AND MAINTENANCE AND THE APPROPRIATE REPLACEMENT PARTS AND ACCESSORIES.

THEY WILL HELP YOU AVOID ERRONEOUS USE AND SUBSEQUENT DAMAGE. ALTHOUGH POLYTRON® UNITS ARE DESIGNED FOR EASE OF SERVICE, THIS DOES NOT RELEASE YOU FROM THE OBLIGATION TO INSPECT YOUR EQUIPMENT CAREFULLY AND TO CLEAN IT THOROUGHLY.

KINEMATICA AG is a specialist manufacturer of machines and equipment for dispersion and mixing technology.

An important objective of these operating instructions is to fully inform you, the user, about the correct and safe use of our equipment.

In order to achieve this, it is essential that you should carefully study chapter 2, “Safety”, and follow the instructions in this book.

1.1.1 RANGE OF VALIDITY

The information in these operating instructions relates to the POLYTRON® identified as follows:

Manufacturer: **KINEMATICA AG**, CH-6014 Luzern
Brand name: **POLYTRON®**
Product name: **POLYTRON® PT 2500 E**

Order No.	Identification
11010055	POLYTRON® PT 2500 E drive, 230V, with EU-plug
11010056	POLYTRON® PT 2500 E drive, 230V, with CH-plug
11010057	POLYTRON® PT 2500 E drive, 230V, with GB-plug
11010058	POLYTRON® PT 2500 E drive, 115V, with US-plug
11090101	POLYTRON® System PT 2500 E, 230 V, consisting of drive, EU-plug, stand ST-P11/600, vessel holder, safety pos. ring
11090102	POLYTRON® System PT 2500 E, 230 V, consisting of drive, CH-plug, stand ST-P11/600, vessel holder, safety pos. ring
11090103	POLYTRON® System PT 2500 E, 230 V, consisting of drive, GB-plug, stand ST-P11/600, vessel holder, safety pos. ring
11090104	POLYTRON® System PT 2500 E, 115 V, consisting of drive, US-plug, stand ST-P11/600, vessel holder, safety pos. ring
11040050	Plate stand ST-P11/600
11045010	Vessel holder for ST-P11/600
11045030	Safety pos. ring for ST-P11/600
11040051	Plate stand ST-P20/600 (double rod design)
11045011	Vessel holder for ST-P20/600
11045031	Safety pos. ring for ST-P20/600

1.1.2 TARGET AUDIENCE

These operating instructions are intended for all authorised users of our machines/equipment. We distinguish different user roles, taking account of the different demands placed on the user by the activity to be carried out.

You will find the definitions of user roles with the demands on the user in chapter 2, “Safety”. You can fulfil one or more of these roles, provided that you meet the corresponding demands.

1.2 ORGANISATIONAL MATTERS

If you are unable to find the answer to any question in the operating instructions, please contact the equipment manufacturer directly.

1.2.1 LOCATION OF THE OPERATING INSTRUCTIONS

The operating instructions can only be of use to you if you always have them at hand. They should therefore always be kept at the place where the equipment is used.

1.2.2 MANUFACTURER CONTACT ADDRESS

KINEMATICA AG
Luzernerstrasse 147a
CH-6014 / Lucerne
TEL: +41 41 259 65 65
FAX: +41 41 259 65 75
e-mail: laboratory@kinematica.ch

1.3 WARNING NOTICES

Please be aware of the meaning of the following warning signs:

SAFETY INSTRUCTIONS MUST BE OBSERVED TO ENSURE SAFE OPERATION .

THIS SYMBOL INDICATES HIGH VOLTAGE, WITH RISK TO HEALTH AND ENVIRONMENT.

**CAUTION!
BEWARE OF HOT SURFACE.**

**CAUTION!
DEVICE NOT DESIGNED FOR USE IN EXPLOSION DANGER ENVIRONMENT.**

2 SAFETY

This chapter is directed at all users of KINEMATICA laboratory equipment. It includes information on safe and optimum use.

2.1 SUMMARY

Any incorrect use of the installed equipment can be dangerous. Inadequately trained users can cause material damage and personal injury. This chapter informs you about the safety concept and the requirements for safe and optimum use of the equipment.

All those authorised to operate, service and repair the equipment are required to study chapter 2, “Safety”.

2.2 SAFETY CONCEPT

The safety concept sets down the entitlement to use the equipment and the responsibilities of the individual users.

The machines and equipment are designed and constructed according to the state of the art and the recognised safety rules.

2.2.1 INTENDED USE OF THE EQUIPMENT

The equipment is designed and constructed for the following use:

- Dispersion and homogenisation of pumpable fluid products in accordance with the technical specifications (see point 3.5) and compatibility with the materials coming into contact with the products.

If you use the equipment for any purpose other than those listed, the manufacturer cannot be held liable for any resulting damage.

2.2.2 IMPROPER USE

Any use other than the “intended use” without the written approval of the manufacturer or any operation outside the technical limits of use is improper use.

2.2.3 USER ROLES

To guarantee safety, we place requirements on the users of the equipment that must be met without fail. Only persons meeting the requirements are authorised to work with the equipment.

We describe all those who work with the equipment as users. Since the requirements of these users are very much dependent on their activity, we distinguish the following user roles.

Contract partner:
The manufacturer can impose legal obligations on the contract partner when the equipment is purchased. The contract partner is obliged to ensure that the equipment is properly used.

Operating company:
The operating company ensures that the equipment is properly used and authorises persons who are entitled to work with the equipment in any one of the defined user roles. They are under the obligation to instruct the users.

Note:
Contract partner and operating company can be the same person.

Service technician:
The service technician is an employee of the operating company and looks after the equipment in special operating mode(s). He is a specialist with mechanical, electrical and electronic professional training. The service technician undertakes commissioning, decommissioning service and repair of the equipment. He must be appropriately trained to be able to carry out the service work required.

Operator:
The operator turns the equipment on and off. In the event of an alarm signal he informs the service technician.

2.2.4 DANGER AREA

System/equipment
The system danger area includes the whole system/equipment including the connecting lead and controls.

Proximity danger area
This refers to all areas within a defined distance of the equipment.

User danger area
This danger area includes all persons working with the equipment.

2.2.5 AREAS OF RESPONSIBILITY

In order that the system/equipment can be used safely and without risk, the users in various roles bear the responsibility for particular danger areas.

Contract partner:
The contract partner bears the responsibility for the “proximity danger area”.

Operating company:
The operating company bears the responsibility for the “user danger area”. Only those users may be authorised to operate the system/equipment who fulfil all requirements of the user roles concerned. In doing so, attention must be paid to the following points:

- It is to be ensured that all users of the system/equipment have fully read and understood chapter 2, “Safety” and act accordingly in a safety-conscious manner.
- It is to be ensured that no unauthorised person carries out work with the system/equipment.
- It is to be ensured that users are informed of the possible risks and dangers connected with the system/equipment.
- It is to be ensured that those being trained or engaged in general training are under the permanent supervision of a trained and authorised person.

Service technician:
The service technician bears the responsibility for the “system/equipment danger area”. He ensures that the system/equipment is at all times free from technical faults, safe and functions correctly.

2.2.6 GENERAL SAFETY RULES

Observe the following general safety rules:
- follow these operating instructions,
- in addition, observe the legal obligations and requirements for accident prevention and environmental protection of the country in which you operate the equipment,
- do not make any modifications to the equipment without the written authorisation of the manufacturer,
- only original replacement parts may be used for repairs,
- before any service work on the equipment, it must be ensured that the electrical supply is switched off,
- after any service, maintenance or repair work has been carried out on the system/equipment, it must be given a test run by the service technician.
- depending on the place at which it is installed, circumstances may require that hearing protection is worn when remaining in the vicinity of the equipment for long periods.

2.3 RESIDUAL DANGERS

When the system/equipment is used in accordance with rules and regulations, residual dangers are minimal.

Residual danger	**Countermeasures**
Tripping over feed or return lines	These should be laid appropriately.
Breakage of glass containers	Wear protective clothing (goggles etc.).
Spitting of the product	
Hearing loss due to loud noise.	According to the application ear protection must be used.
Tilting of the device	Use stable, non-slip base and the safety stands from KINEMATICA

IN EVERY CASE THE ELECTRICAL INSTALLATION HAS TO BE DONE BY TECHNICIAN!

2.4 WARNINGS

	• Ensure that the rated voltage of the equipment matches the supply. • Before changing any dispersing aggregate, the line cord has to be plugged out • When a electrical power blackout occurs, the device has to be switched- off using the main switch, avoiding the device to restart automatically. • IT IS IMPORTANT THAT THE MAINS SUPPLY WHERE THE DEVICE IS PLUGGED IN COMPLIES WITH THE INFORMATION ON THE TYPE LABEL AND THE INTERNATIONAL STANDARDS FOR POWER SUPPLIES. IF NOT, SUCCESSFUL OPERATION CANNOT BE GUARANTEED
	• In the event that hazardous chemicals or materials that endanger health can influence the surroundings or use of the equipment, appropriate countermeasures must be taken.
	• At long term use the aggregate and the coupling may get hot – danger of skin burn.

	• The equipment may not be operated in explosive areas • It is not allowed to work with fluids which are highly inflammable. • It is not allowed to mix materials which can cause strong exothermal reactions
	• **THE DEVICE MAY ONLY BE OPENED BY AUTHORISED KINEMATICA SERVICE STATIONS.** • Ensure that enough free space is available at the backside of device, so that effective air flow and cooling is assured. Insufficient cooling may lead to a decrease of power output. • The device has to be placed in a manner that dirt or fluids cannot penetrate through the ventilation slots at back side of the drive. • POLYTRON® dispersion aggregates may not be operated dry – the lower sleeve bearing is cooled and lubricated by the medium being processed. Running dry will destroy the sleeve bearing. • The dispersing aggregates should be cleaned after every operation. • Never pull the coupling during operation – the aggregate could fall out of the coupling.
	• When the line cord is plugged, never touch the saw teeth of the aggregate – danger of injuries due to rotating shafts and blades
CE	• KINEMATICA AG products comply with all the usual CE directives, carry the CE marking and are delivered with a corresponding declaration of conformity.

3 DESCRIPTION OF THE EQUIPMENT

The PT 2500 E system conforms to all current and relevant CE regulations, carries the CE sign and is supplied with the relevant certificate of conformity.

3.1 OVERVIEW

The POLYTRON® System PT 2500 E prepares finest dispersions and homogenisations and is suitable for use with working volumes up to 2000 ml (depending on the viscosity of the product and the dispersing aggregate used). The drive can be equipped with a wide range of POLYTRON® dispersing-aggregates. The aggregates are easy to change using the quick-coupling.

For a ready-to-use system you need:

- **Drive PT 2500 E**
- **A stand, ST-P11/600 or ST-P20/600**
- **A dispersing aggregate**
- **A mains connection according to the type label**

On the following pages pictures and a description of the main components of the complete system PT 2500 E can be found.

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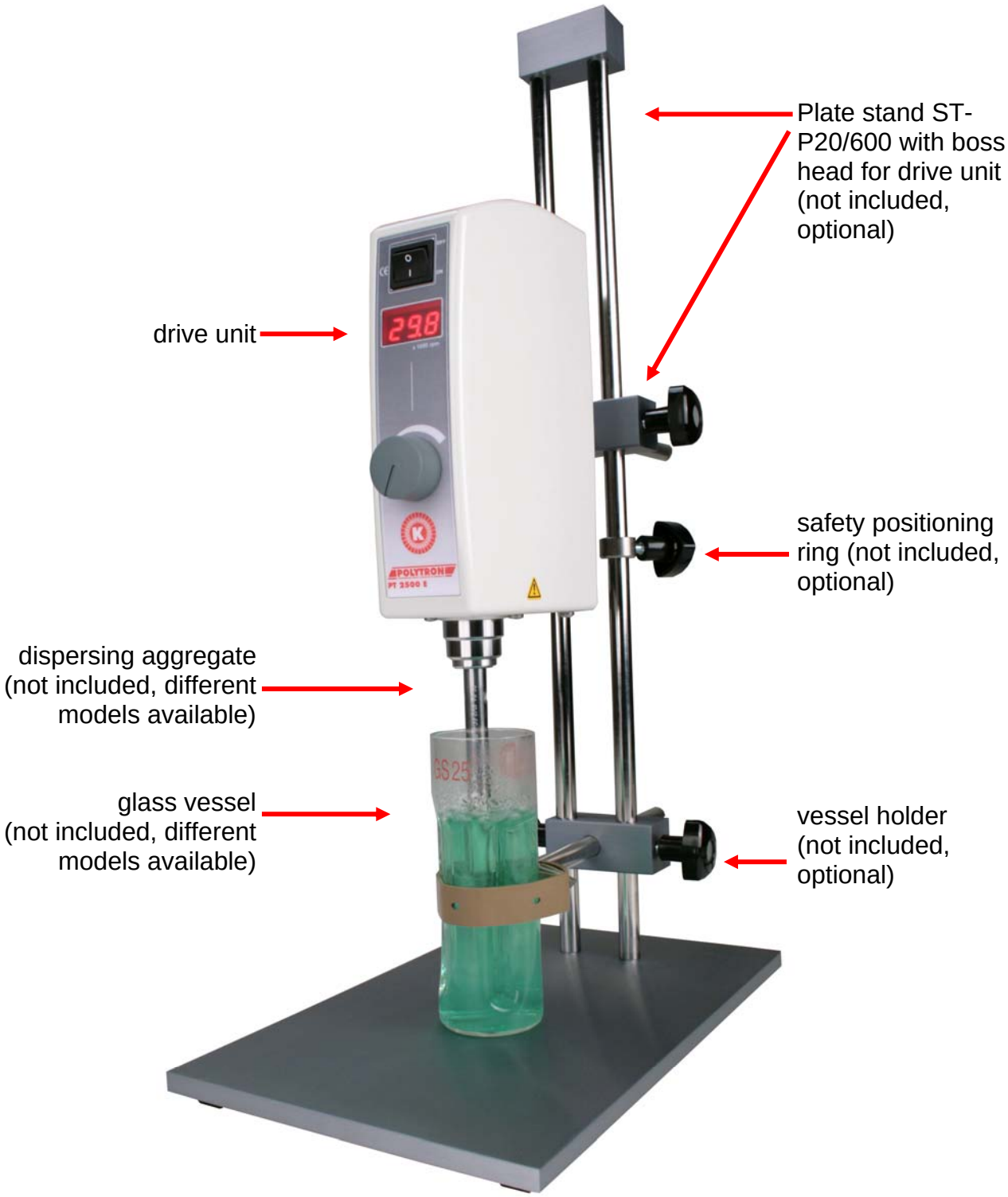
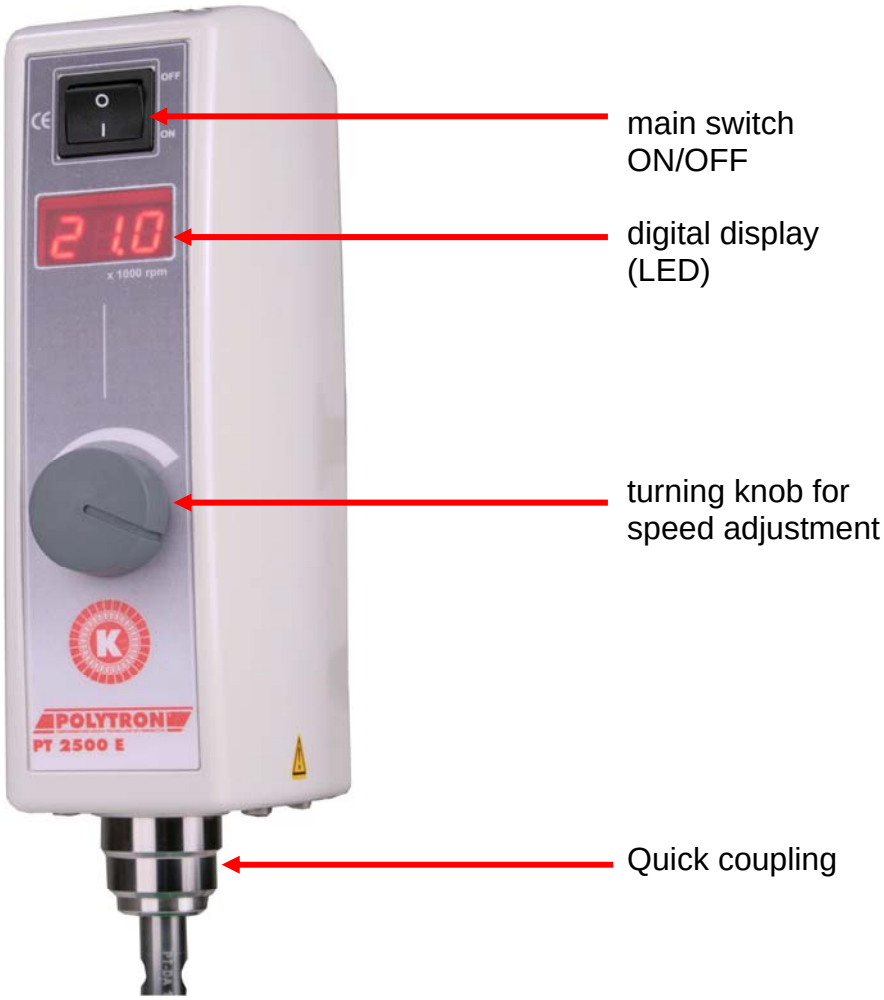


Plate stand ST-P20/600 with boss head for drive unit (not included, optional)
drive unit
safety positioning ring (not included, optional)
dispersing aggregate (not included, different models available)
glass vessel (not included, different models available)
vessel holder (not included, optional)

3.2 DRIVE UNIT

The drive unit PT 2500 E is equipped with a 500 W motor and will be started using the main switch placed at the front side. The speed will be adjusted using the turning knob on the front side of the device. Within the speed range of up to 30'000 rpm, the integrated closed loop speed control will tune the speed to any adjusted value, independent from load changes. The actual speed can be read from the digital display (LED)
Furthermore the electronic control system is equipped with safety functions with automatic shut down to prevent the drive being overheated or blocked. A detailed description of possible errors and countermeasurements is listed in chapter 6 „TROUBLE SHOOTING"

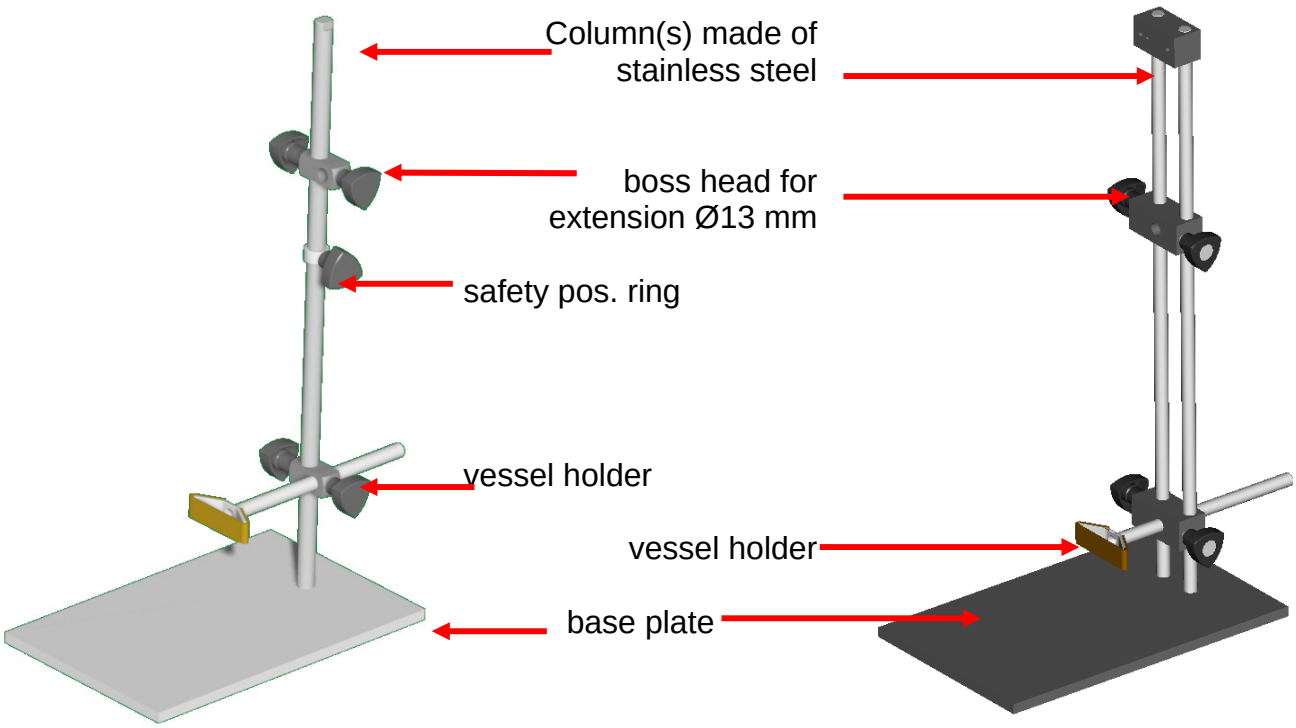


3.3 STANDS ST-P11/600 & ST-P20/600

The drive PT 2500 E is designed for using with a stand. KINEMATICA recommends the standard plate stand ST-P11/600 or the plate stand ST-P20/600 (double rod design). According to the size of the working vessel a vessel holder may be used.

Description of the main components of the two stands:

stand ST-P11/600 **stand ST-P20/600**

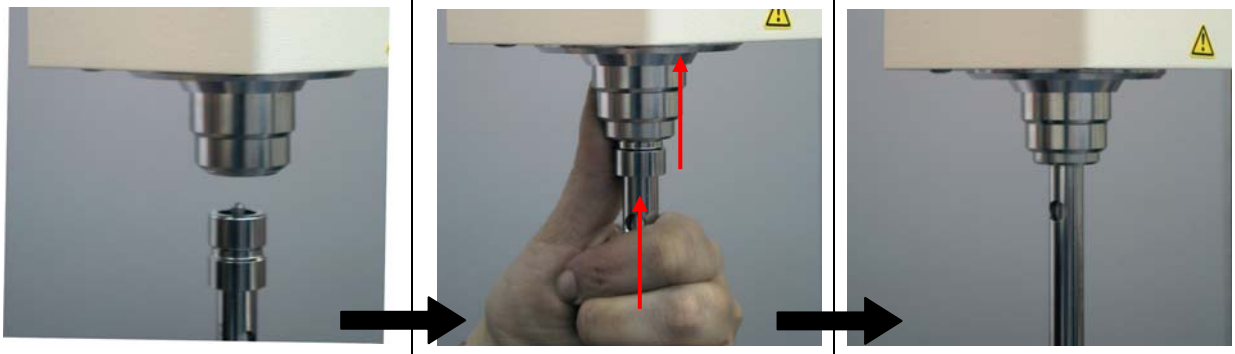


3.4 POLYTRON® DISPERSING-AGGREGATES

A wide range of dispersing aggregates with diameters of 3, 5, 7, 12, 20 and 25 mm are available. For questions concerning POLYTRON® dispersing aggregates please get in contact with KINEMATICA or your local specialist dealer.

Due to the quick coupling, POLYTRON® dispersing aggregates can be fitted and replaced very easily. The three pictures below show the mounting of an aggregate.

For easy mounting, the coupling part of the aggregate and the drive unit should be free of dirt.	Push the slider of the coupling upwards, at the same time push the aggregate into the coupling.	Push the aggregate upwards and at same time twist it a little until it has snapped in and the slider returns downwards



To remove the aggregate, proceed in reverse direction.

CAUTION !:
BEFORE REMOVING AND PUSHING UP THE SLIDER OF THE COUPLING, HOLD YOUR DISPERSING AGGREGATE IN ONE HAND AVOIDING THE AGGREGATE TO FALL DOWN WHEN PUSHING UP THE SLIDER.

CAUTION!
WHEN REPLACING AN AGGREGATE THE LINE CORD HAS TO BE DISCONNECTED FROM THE POWER SUPPLY

CAUTION!
AT LONGTERM USE AT HIGH LOADS, THE AGGREGATE & THE COUPLING CAN HEAT UP TO HIGH TEMPERATURE LEVELS – DANGER OF SKIN BURN .

3.5 TECHNICAL SPECIFICATIONS

Drive PT 2500 E		
motor type	universal motor	
supply voltage	230 V ~	100…120 V ~
supply frequency	50/60 Hz	
max. speed	30'000 rpm	
Speed indication	LED, 3 digits, actual speed	
Speed measurement	Digital, direct by HAL-probe (no calibration needed)	
input power	Max. 500 W	
output power	Max. 280 W	
soft-start	Yes	
noise emission (drive only)	lower than 75 dB(A) at 30,000 rpm	
direction of rotation	clockwise, seen from above	
ambient temperature	0 – 40°C	
relative humidity	95% max.	
certified standards	EMC according to: safety according to:	IEC/EN 61000-6-3 IEC/EN 61000-6-2 IEC/EN 61010-2-51
protection type	IP 20	
max. period of continuous operation	depending on load & speed 100 % duty time is possible.	
Dimensions	157x76x236 mm (LxWxH)	
weight	drive unit 1.8 kg	

4 INSTALLATION

4.1 UNPACK

Open the dispatch box and check that the contents agrees with the delivery note.

CHECK ALL PARTS FOR POSSIBLE TRANSPORT DAMAGE. INFORM US OR YOUR DEALER IMMEDIATELY ABOUT ANY DISAGREEMENT OR FAULT. IF POSSIBLE SEND US DIGITAL PHOTOS BY EMAIL TO LABORATORY@KINEMATICA.CH

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4.2 ASSEMBLING OF THE DRIVE

The PT 2500 E drive arrives fully equipped with the extension suitable for the stand ST-P11/600 or ST-P20/600. Just mount the drive at the stand and plug the line cord into the power inlet connection at the back side.

4.3 ASSEMBLING OF THE STAND WITH ACCESSORIES

See assembly instruction / manual supplied with the stand.

4.4 STARTING UP

- Ensure that the voltage marked on the type label complies with your power supply
- Immerse the aggregate in the product. The optimum depth of immersion of the dispersion attachment is about 70 % of the total depth of product in the container. Never immerse the upper coupling head and upper hole of the dispersion aggregate.
- Turn on at the main switch.
- Set the desired speed using the turning knob

Remark:
In some cases it can be advantageous to place the vessel excentric in order to get more turbulences for better mixing of the product.

POLYTRON® DISPERSING AGGREGATES MAY NOT BE OPERATED DRY – THE LOWER SLEEVE BEARING IS COOLED AND LUBRICATED BY THE MEDIUM BEING PROCESSED. RUNNING DRY WILL DESTROY THE SLEEVE BEARING.

THE DISPERSING AGGREGATES SHOULD BE CLEANED AFTER EVERY OPERATION.

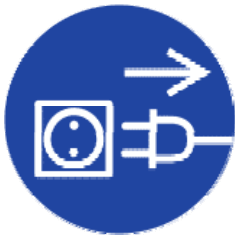
NEVER TOUCH THE ROTATING AGGREGATE – DANGER OF SEVERE CUT-INJURIES.

5 MAINTENANCE

Your POLYTRON® unit is designed for ease servicing. Nevertheless, it is essential to inspect your equipment carefully and to clean it thoroughly.

THE EQUIPMENT MUST BE DISCONNECTED FROM THE ELECTRICAL SUPPLY:

- **DURING ANY WORK ON THE EQUIPMENT, IN ORDER TO AVOID ANY PERSONAL INJURY OR OTHER DAMAGE**
- **WHEN CHANGING OR REMOVING THE DISPERSING AGGREGATE**



5.1 DRIVE

Under normal working conditions, the PT 2500 E drive requires no special servicing. Parts such as the motor brushes and bearings are subject to natural wear.

The following are standard values for wear parts of the drive:

- Ball bearings: several 1000's of operating hours.
- Motor brushes: Approx. 150 hours of operating at rated power.

We strongly recommend that service work and repairs should be carried out only by authorised KINEMATICA service centres or by KINEMATICA directly, where original replacement parts are available.

Any unauthorised modification or manipulation of the unit or its equipment leads to immediate annulment of the warranty.

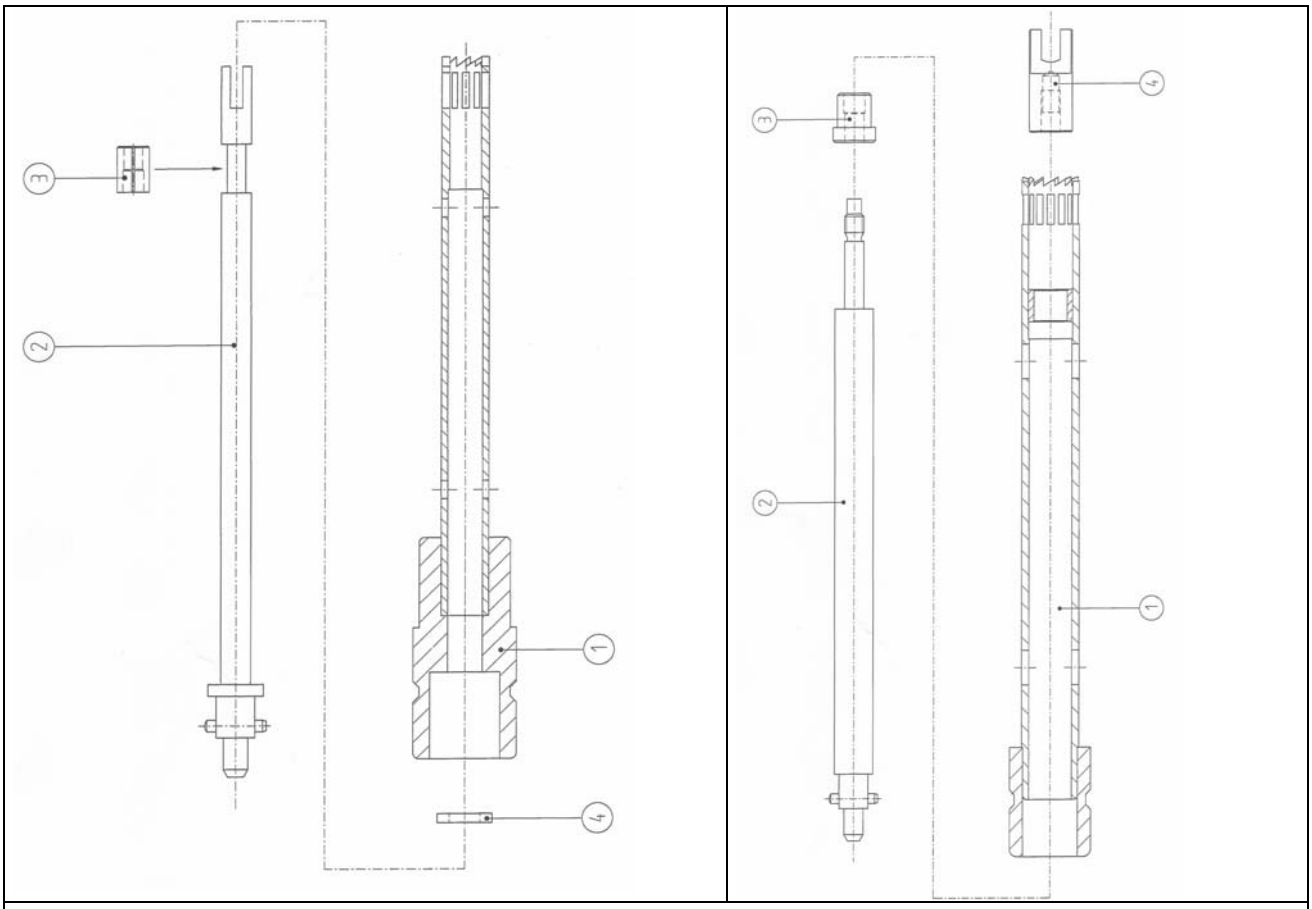
5.2 CLEANING AND MAINTENANCE OF THE AGGREGATES

EC-aggregates, (EC stands for EASY CLEAN) are easy to disassemble and clean. They can be sterilised in an autoclave by standard methods. In the following chapters the de/assembling procedures will be described.

CAUTION!
BE AWARE OF SHARP EDGES AND TEETH WHEN DE/ ASSEMBLING AGGREGATES – DANGER OF CUT-INJURIES

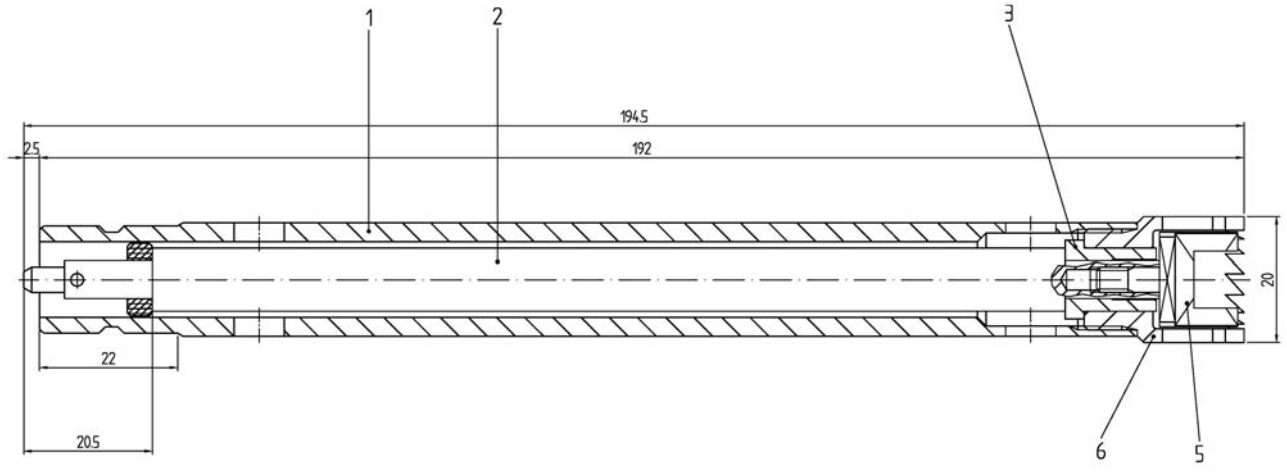
5.2.1 Dis/assembling of EC-aggregates with size Ø3, Ø5, Ø7 and Ø 12 mm

PT-DA 03/2EC-E050	PT-DA 05/2EC-E085	PT-DA 07/2EC-E107	PT-DA 12/2EC-E157
With the universal tool supplied, carefully knock the rotor and attached shaft out in the direction of the coupling and then draw them out in the same direction.			With this attachment you receive an additional tool. Use one tool to hold the shaft and the other to turn the rotor anti-clockwise and withdraw it. You can then withdraw the shaft from its tube.
The lower sleeve bearing is slit and can be opened and pulled over the shaft. The upper bearing can be pulled off in the direction of the rotor.			Using the tool, the sleeve bearing can be pushed out in the direction of the coupling.
Replace defective parts. Bearings should only be replaced in pairs.			Replace defective parts.
Reassemble in the reverse order.			Use the shaft to press the sleeve bearing into the stator tube from the coupling side. Screw on the rotor and tighten gently.



After every disassembly, and especially after changing the bearings, a functional test should be carried out in water.

5.2.2 Dis/assembling of EC-aggregates with size Ø20 and Ø 25 mm

PT-DA 20/2EC-E170	PT-DA 25/2EC-E170 PT-DA 25/2FEC-E170
With this aggregate you receive an additional tool. Use one tool to hold the shaft and the other to turn the rotor anti-clockwise and withdraw it. You can then withdraw the shaft with the upper slide bearing from its tube.	With this aggregate you receive an additional tool. Use one tool to hold the shaft and the other to turn the rotor anti-clockwise and withdraw it. You can then withdraw the shaft with the upper slide bearing from its tube.
Using the tool, the sleeve bearing can be pushed out in the direction of the coupling.	Using the tool, the sleeve bearing can be pushed out in the direction of the coupling.
Further the stator can be removed from the stator tube. Turn the stator clockwise (left-hand thread) and withdraw it.	Further the stator can be removed from the stator tube. Turn the stator clockwise (left-hand thread) and withdraw it.
Replace defective parts.	Replace defective parts.
Screw the stator back onto the stator tube (left-hand thread). Use the shaft to press the sleeve bearing into the stator tube from the coupling side. Screw on the rotor and tighten gently.	Screw the stator back onto the stator tube (left-hand thread). Use the shaft to press the sleeve bearing into the stator tube from the coupling side. Screw on the rotor and tighten gently.
	
After every disassembly, and especially after changing the bearings, a functional test should be carried out in water.	

For a replacement of the bearings or other parts please contact a certified KINEMATICA service center or KINEMATICA directly.

Any unauthorised modification or manipulation of the unit or its equipment leads to immediate annulment of the warranty.

6 TROUBLE SHOOTING

PROBLEM	REASON	CORRECTIVE MEASURES
Unusual noises	Damaged drive bearings	Change ball bearings. Trace & replace defective parts (shaft, bearings)
	Damaged aggregate bearings	Change bearings
	Rotor/stator interference	Trace and replace defective parts (shaft, bearings)
Drive automatically stops & an alternating beeping sound is audible and the message “HO” is shown on the display	Inadequate ventilation	Check if ventilation slots are clear. Cool down the device & restart
	Thermal overload	Check manner of use. Cool down the device & restart.
Vibrations	Bent shaft	Replace shaft
	Worn bearing(s)	Replace bearing(s)
	Defective coupling	Trace and replace defective parts
Drive does not start respectively suddenly stops.	Defective internal control	Send the equipment to the nearest authorised KINEMATICA service centre or directly to KINEMATICA AG
A constant beeping sound is audible and the message “BL” is shown on the display	Drive is blocked	Check the aggregate for solid particles which may be blocking the rotor, remove the particles, turn off the drive and restart operation.

7 ACCESSORIES

A large selection of special homogenising vessels is available, which can improve the efficiency of the processing of your product. Closed vessels to withstand vacuum or pressure can also be supplied.

Ask your dealer or contact KINEMATICA AG directly.

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8 WARRANTY

KINEMATICA AG guarantees that their equipment will run free of any fault related to materials or manufacturing faults for **24 months**.

If thorough testing shows a fault to be due to either of the above causes, KINEMATICA AG guarantees that the equipment will be repaired or replaced free of charge.

The warranty does not cover parts that are subject to normal wear. It is void if any person other than an employee of KINEMATICA AG or their appointed representative has made modifications to the equipment or if the damage is due to failure to comply with the operating instructions, to carelessness, accident, incorrect use or incorrect supply voltage.

KINEMATICA AG reserves the right to make technical changes to the equipment without modifying equipment delivered earlier in the same way.

In the event of technical problems, for spare parts requirements or for advice, contact our regional appointed agent, your prefered dealer or us directly at:

KINEMATICA AG

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